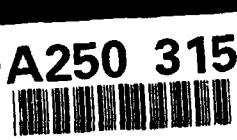


REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1a. REPORT SECURITY CLASSIFICATION Unclassified	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release distribution unlimited
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE	
4. PERFORMING ORGANIZATION REPORT NUMBER(S)	5. MONITORING ORGANIZATION REPORT NUMBER(S)
6a. NAME OF PERFORMING ORGANIZATION U.S. Army War College 6b. OFFICE SYMBOL (If applicable)	7a. NAME OF MONITORING ORGANIZATION
6c. ADDRESS (City, State, and ZIP Code) Carlisle Barracks, PA 17013-5050	7b. ADDRESS (City, State, and ZIP Code)
8a. NAME OF FUNDING/SPONSORING ORGANIZATION 8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c. ADDRESS (City, State, and ZIP Code)	10. SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO. / PROJECT NO. / TASK NO. / WORK UNIT ACCESSION NO.

11. TITLE (Include Security Classification)
The Strategic Defense Initiative in a Changing World

12. PERSONAL AUTHOR(S)
Mr. Jerry E. Peacock

13a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (Year, Month, Day)	15. PAGE COUNT
Individual	FROM _____ TO _____	16 March 1992	45

16. SUPPLEMENTARY NOTATION

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	

19. ABSTRACT (Continue on reverse if necessary and identify by block number)
In response to dramatic changes in the global strategic environment, the United States must move from a bipolar to a multipolar defense strategy. Our emerging strategy must concentrate on both global and regional conflicts in which ballistic missiles of varying ranges and weapons of mass destruction may be employed. The proliferation of space and ballistic missile capabilities, especially into the Third World, will directly impact upon the future strategic defense requirements of the United States and its allies. The changing global geo-political situation, along with technology proliferation, will require an effective ballistic missile defense through the Strategic Defense Initiative (SDI) Program, especially to defend against ballistic missile attack in regional conflict. More importantly, however, the changing global threat will considerably influence future arms-control regimes. This paper analyzes the emerging threat. It focuses on the growing weapons of mass destruction and on proposed redirection of the SDI Program to adequately respond to the proliferation threat. Finally, it reviews how international arms-control

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT ☐ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS	21. ABSTRACT SECURITY CLASSIFICATION
22a. NAME OF RESPONSIBLE INDIVIDUAL PATRICK T. THORNTON	22b. TELEPHONE (Include Area Code) 717-245-3721 22c. OFFICE SYMBOL AWCAC

Block 19. Abstract (Cont.)

regimes can be redirected from an East-West orientation to a broader global focus relative to missile proliferation.

USAWC MILITARY STUDIES PROGRAM PAPER

The Strategic Defense Initiative in a Changing World

AN INDIVIDUAL STUDY PROJECT

by

Mr. Jerry E. Peacock

Colonel Patrick T. Thornton, USA
Project Adviser

U.S. Army War College
Carlisle Barracks, Pennsylvania 17013

ABSTRACT

AUTHOR: Mr. Jerry E. Peacock

TITLE: The Strategic Defense Initiative in a Changing World

FORMAT: Individual Study Project

DATE: 16 March 1992 **PAGES:** 45 **CLASSIFIED:** Unclassified

In response to dramatic changes in the global strategic environment, the United States must move from a bipolar to a multipolar defense strategy. Our emerging strategy must concentrate on both global and regional conflicts in which ballistic missiles of varying ranges and weapons of mass destruction may be employed. The proliferation of space and ballistic missile capabilities, especially into the Third World, will directly impact upon the future strategic defense requirements of the United States and its allies. The changing global geo-political situation, along with technology proliferation, will require an effective ballistic missile defense through the Strategic Defense Initiative (SDI) Program, especially to defend against ballistic missile attack in regional conflict. More importantly, however, the changing global threat will considerably influence future arms-control regimes. This paper analyzes the emerging threat. It focuses on the growing threat posed by the proliferation of ballistic missiles and weapons of mass destruction and on proposed redirection of the SDI Program to adequately respond to the proliferation threat. Finally, it reviews how international arms-control regimes can be redirected from an East-West orientation to a broader global focus relative to missile proliferation.

TABLE OF CONTENTS

LIST OF FIGURES

INTRODUCTION

In response to dramatic changes in the global strategic environment, the United States must move from a bipolar to a multipolar defense strategy. Our emerging strategy must concentrate on both global and regional conflicts in which ballistic missiles of varying ranges (short, medium, intercontinental) and weapons of mass destruction may be employed. The proliferation of space and ballistic missile capabilities, especially into the Third World, will directly impact upon the future strategic defense requirements of the United States and its allies. The changing global geo-political situation, along with technology proliferation, will require an effective ballistic missile defense (BMD) through the Strategic Defense Initiative (SDI) Program, especially to defend against ballistic missile attack during regional conflict. More importantly, however, the changing global threat from ballistic missile proliferation will considerably influence future U.S. arms-control strategies, negotiations, and agreements.

The spread of new technology, especially ballistic missiles with possible nuclear, biological, and chemical capabilities, poses an increasing threat to the United States -- both to its forces and to its global interests. During the current transition to a multipolar world, the United States must reassess its long-term strategic defense needs, especially in view of the

growing ballistic missile threat and the proliferation of weapons of mass destruction. This paper will analyze the emerging threat. It will focus on the emerging threat posed by the proliferation of ballistic missiles and weapons of mass destruction, and on the proposed national redirection of the SDI Program to adequately respond to the proliferation threat. Finally, it reviews how international arms-control negotiations can be redirected from an East-West orientation to a broader global focus relative to missile proliferation.

BALLISTIC MISSILE PROLIFERATION

Ballistic missile proliferation did not emerge during the 1960's and 1970's. Few Third World countries had access to ballistic missiles during the period; those that did, possessed missiles with limited range. Additionally, the potential linkage between nuclear, biological, and chemical ordinance proliferation and ballistic missile proliferation within the Third World had not drawn serious attention from the international community.[1] During the late 1960's and 1970's, the Third World acquired ballistic missiles primarily from the United States and the former Soviet Union. However, by the late 1980's, ballistic missile and space technology was not limited to the developed world, but had indeed proliferated into the Third World through cadres of scientists and technicians with the skills to build and operate ballistic missile systems.[2]

Additionally, the strategic threat to the United States and its allies that has traditionally come from the former Soviet Union, continues. Though the Cold War is over, and the danger of war in Europe and of a nuclear exchange has greatly diminished, the disintegrating former Soviet Union continues to pose a ballistic missile threat to the United States. The new commonwealth has replaced the single central Soviet political and military authority which exercised tight central control over

nuclear forces and maintained a comprehensive system to safeguard and ensure missile physical security. Russia and the newly sovereign republics possess some 30,000 nuclear weapons, the most powerful of which continue to be aimed at the United States.[3] While the weapons remain, control of them has been decentralized. Thus, strategic defense requirements must continue to address this threat posed by the spawning of sovereign states from the former Soviet Union. They surely possess weapons of mass destruction and the means by which to deliver them. This, coupled with those missiles proliferated within the Third World, poses an unprecedented global uncertainty and instability.

Because of proliferation of ballistic missiles throughout a multipolar world, however, the present threat comes more from other regions than the former Soviet Union. Smaller states with unstable governments, regional strife, and modern weapons of mass destruction now pose a greater threat to world stability than did the tensions of the Cold War. The threat posed by ballistic missiles in regional conflicts was perhaps the most striking lesson to be learned from the Gulf conflict. The difficulties of locating and destroying the small mobile launchers prior to launch was clearly demonstrated. Additionally, the "SCUD" launches into large civilian population centers of Israel and Saudi Arabia has re-emphasized the fact that construction of hardened shelters to protect civil centers is not feasible.[4] Thus, development of an effective ballistic missile defense system to intercept and destroy such missiles is of critical

importance.

Scoping The Proliferation Problem

In order to assess the impact of ballistic missile proliferation, the problem must be quantified. Quantifying the ballistic missile proliferation problem, however, is a difficult task. Spin-off technologies from such legitimate civilian space research programs as sub-orbital sounding rocket (SR) and space launch vehicle (SLV) programs must be included because of their inherent similarities and applications to military surface-to-surface ballistic missile systems.[5] The application of propellant technologies, command and control, and launch facility operations under the mantle of a civilian space launch program are directly correlatable to acquisition of long-range ballistic missiles. Thus, capabilities gained from civilian space launch programs can and are applied to surface-to-surface ballistic missile programs throughout the world.

Just how great is the growing missile proliferation threat? The former Director, Central Intelligence, William Webster recently informed Congress that by the year 2000 "at least six Third World countries will probably have ballistic missiles with ranges of up to 3,300 miles." Additionally, he stated that four of these countries developing missile capabilities currently have nuclear weapons or advanced programs for development of such weapons. Judge Webster further estimated that by the end of the decade four additional nations could have similar capabilities,

bringing to ten the number of Third World countries possessing ballistic missiles with a range of 3,300 miles equipped with a nuclear warhead.[6]

Though the six countries developing ballistic missiles with such range and warheads do not seem to present an immediate threat to the continental United States, the United States cannot ignore this growing threat in the future. Further, the U.S. cannot ignore the threat posed to our allies today by the spread of short-range ballistic missiles. The Strategic Defense Initiative Organization (SDIO) in its 1991 Annual Report to Congress estimates that twenty-four developing countries will possess ballistic missiles of varying ranges by the year 2000. The SDIO estimates that as many as nine of these countries will have or will be near to having nuclear capabilities. Additionally, SDIO estimates that as many as thirty countries may have chemical weapons and ten may have biological weapons.[7]

It is difficult to determine a definitive or authoritative list of current and projected global ballistic missile capabilities. Nonetheless, one fact is agreed upon by all: ballistic missile programs are found in all regions of the world -- the Middle East, South Asia, East Asia, and South America.[8] This fact, coupled with the real prospect that Third World regional conflicts will be replacing the traditional East-West European conflict, now poses the greatest threat to international security. Thus, ballistic missile proliferation, along with chemical, biological and nuclear warheads, signifies that the

expanding regional instabilities and the threat from these weapons of mass destruction must be taken seriously.[9]

As stated, missile proliferation has spread to every region of the developing world. The most concentrated area of ballistic missile proliferation is in the regions stretching from North Africa through the Middle East; Egypt, Iran, Iraq, Israel, Kuwait, Libya, Saudi Arabia, Syria, and Yemen all possess ballistic missiles.[10] In Southern Asia, there is a lesser concentration, but an equally threatening proliferation problem, considering the missile capabilities of Afghanistan, India, and Pakistan.[11] In East Asia, North and South Korea, Taiwan, and Indonesia have ballistic missiles or, in the case of Indonesia, a sounding rocket (SR) and space launch vehicle (SLV) testing program.[12] The Americas region immediately concerns the United States. Cuba possesses short-range ballistic missiles, while Argentina has an established ballistic missile development program.[13] Brazil has operational SRs, along with SLV and ballistic missile development programs.[14] In Africa, South Africa has joined a multi-national development effort for both a ballistic missile and an SLV.[15]

In summary, a total of twenty-two countries have been identified and documented by open sources as proliferating ballistic missiles. These countries either have an operational ballistic missile or SR, or are involved in a development program to acquire a ballistic missile, SR, or SLV by the year 2000. These proliferation nations are: Afghanistan, Algeria,

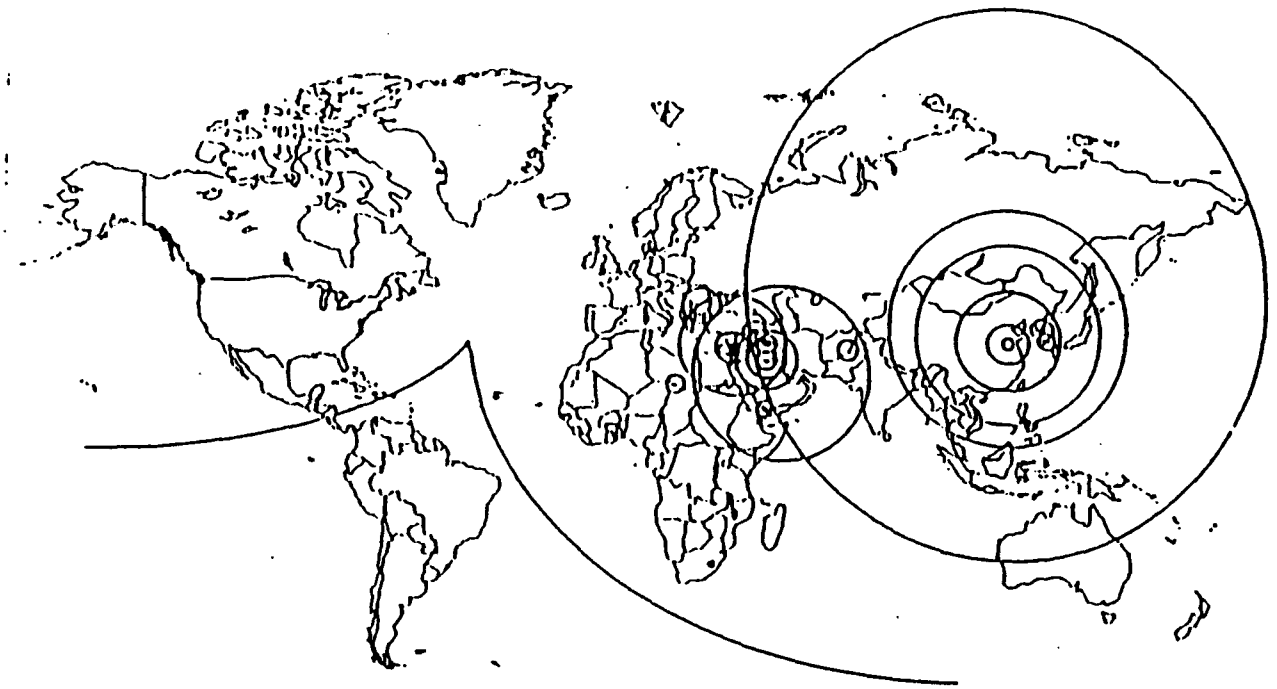
Argentina, Brazil, Peoples Republic of China, Cuba, Egypt, India, Indonesia, Iran, Iraq (even after the Gulf War), Israel, Kuwait, Libya, North Korea, Pakistan, Saudi Arabia, South Africa, South Korea, Syria, Taiwan, and Yemen.[16]

Not included in this summary, or within the projected threat rings in Figures 1 and 2, Greece also has ballistic missiles acquired from the United States.[17] Greece seems unlikely to use these aging Honest John missiles, but there are territorial disputes related to the Aegean Sea and islands (mineral rights), along with an on-going dispute over Cyprus and a long history of tension between Greece and Turkey. Here also we see a framework of tension and previous hostilities in the region between these two NATO allies.

The strategic interests of the United States are increasingly likely to be threatened around the globe. The threat to U.S. and allied forces in various regions from ballistic missiles and weapons of mass destruction has forced a reassessment of U.S. strategic defense requirements. Figure 1 illustrates the threat posed by the sixteen Third World nations assessed to have ballistic missiles today. Many of the Third World systems are short-range ballistic missiles (less than 200 miles), which are among the oldest and most proliferated in the Third World.[18] As seen in the Gulf War, however, these weapons pose an immediate threat to military forces in the region. More importantly, the use of such weapons to broaden a regional conflict can be as much a threat as the weapons themselves. Many

of the Third World missiles represented in Figure 1 can be considered strategic weapons in regional conflicts, where they could attack cities, destroy military industrial complexes, threaten to expand the scope of the conflict, and greatly reduce the nation's will to fight. In the near term, however, these systems may be of a lesser threat as a tactical battlefield weapon.

Figure 1 indicates the threat posed by the proliferation in both a tactical and theater strategic situation. Further, it portrays the strategic threat from ballistic missiles in Europe and from the newly independent former Soviet republics. Though the proliferation of ballistic missiles to the Third World poses an ever growing threat, the strategic defense requirement for the United States to deter attack from the former Soviet Union missile force remains. The United States cannot focus only on the East-West threat of a massive fly-out launched by previous Soviet strategic forces. On the other hand, the U.S. cannot simply forget that some 30,000 nuclear warheads remain within the former Soviet Union.



Country--System: Afghanistan--SCUD B; Algeria--FROG 7; Bulgaria--SS-21; China--M-11, M-9, DF-2, DF-3, JL-1, DF-4, DF-5; Cuba--FROG 4, FROG 7; Egypt--FROG 3, FROG 7, SAKR 80, SCUD B; Iran--OGHAB, SHAHIN 2, NAZEAT, SCUD B; Iraq--FROG 7, SCUD B, AL-HUSSEIN, AL-ABBAS; Israel--LANCE, JERICHO I, JERICHO II; Kuwait--FROG 7; Libya--FROG 7, SCUD B; N. Korea--FROG 5, FROG 7, SCUD B; Saudi Arabia--DF-3A; S. Korea--HONEST JOHN, KSSM; Syria--FROG 7, SS-21, SCUD B; Yemen--FROG 7, SS-21, SCUD B.

Note: Range circles are notional and centered on arbitrarily chosen points near the possessors' borders. Circles are approximations and do not depict totality of potential coverage. ICBMs are not depicted.

FIGURE 1 CURRENT THIRD WORLD BALLISTIC MISSILES CAPABILITIES[19]

Other than former Soviet missiles, only Chinese missiles have the capability to threaten U.S. territory.[20] The Chinese are expected to deploy additional strategic and regional nuclear forces in the 1990's. Additionally, the Chinese have shown a willingness to market missiles systems to earn hard currency. The Chinese probably will continue to modernize their intercontinental ballistic missiles (ICBM's) as well as their

shorter-range missiles. Further, they are expected to deploy a new mobile ICBM during the 1990's.[21] Thus, one of the world's most significant military forces will continue to threaten U.S. territory and will continue to be a primary source of proliferation of missile systems throughout the globe.

Figure 2 illustrates the threat posed by the acquisition of ballistic missiles by all twenty-two Third World nations that either currently have ballistic missiles; or have the technology, expertise, and a program to build a missile system; or have a program to improve currently owned systems by the year 2000.

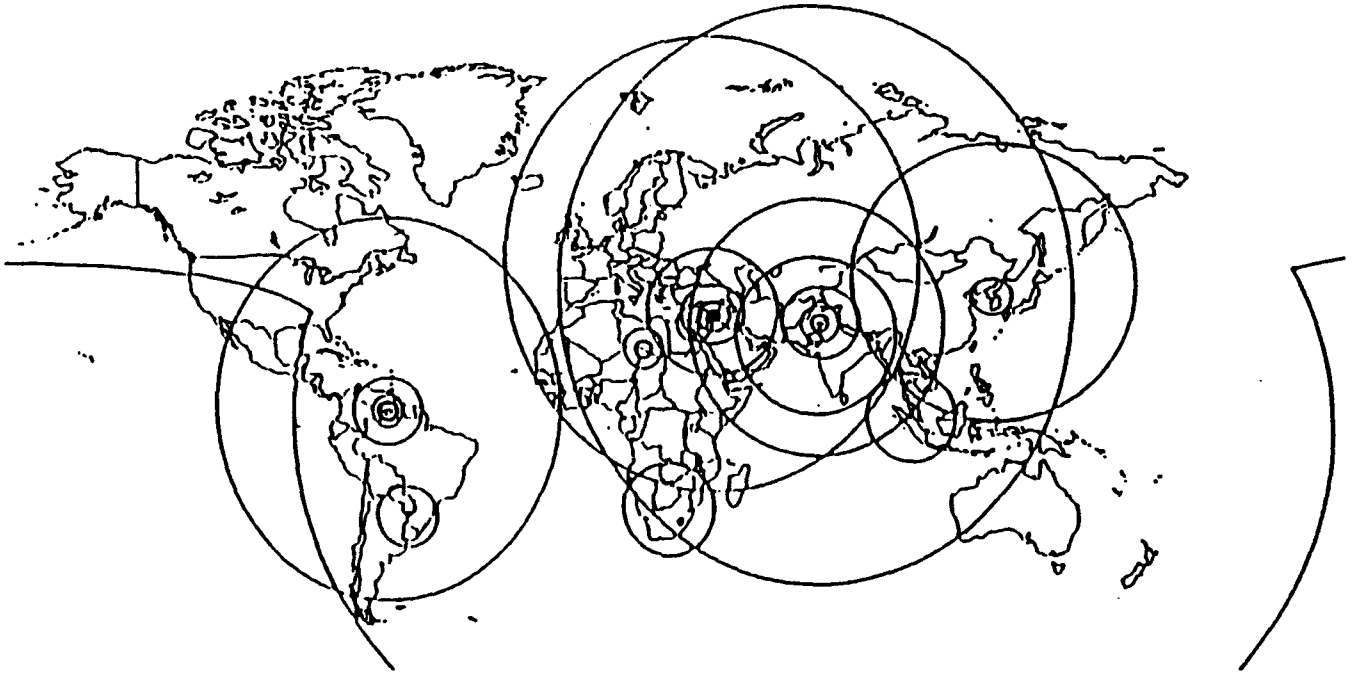


FIGURE 2. PROJECTED THIRD WORLD BALLISTIC MISSILE PROLIFERATION BY YEAR 2000[22]

Given that the likelihood of a major conventional war in Europe leading to a major nuclear war between the East and West has been greatly reduced, U.S. strategic requirements now focus on strategic defense not only of the continental U.S., but also globally within regions where U.S. and allied interests may be threatened. Critics of a strategic defense requirement have assumed that few Third World nations would be able to pose a threat to the continental United States by the year 2000. U.S. Representative Jon Kyl, of the House Armed Services Committee recently responded to such critics:

> The decisions that provided technological advantage in the Persian Gulf were made more than nine years ago.... It is a mistake to say that we have nothing to worry about, since few if any potential enemies could reach the continental United States by 2000. It's going to take us that long to get an effective system deployed. The most important point is that you can deter Third World aggressors from acquiring these weapons,...[23]

Additionally, as depicted in Figure 2, Third World countries will continue to develop and acquire ballistic missiles and weapons of mass destruction. As the Third World acquires longer range missiles, strategic implications transcend specific regions. Strategically, the United States must contemplate intra-regional conflict, inter-regional conflict and potential conflicts between and among coalitions or confederations of regions.

CHANGING STRATEGIC DEFENSE REQUIREMENTS

The Strategic Defense Initiative (SDI) as envisioned by President Reagan in the early 1980's was a funded evaluation program for possible system development, not the "STAR WARS" system that its critics have so vehemently protested. While the final shape of a Strategic Defense system is still being molded, the program's fundamental goal has not changed. The goal of the SDI Program was and is " to conduct a vigorous research and technology program that could provide the basis for an informed decision regarding the feasibility of eliminating the threat posed by ballistic missiles of all ranges."[24]

The United States has historically relied on the retaliatory forces of a Mutual Assured Destruction (MAD) strategy for deterrence against the massive build-up of the former Soviet strategic arsenal. The arms-race of the 1960's and 1970's was the only alternative for U.S. strategists. The U.S. strategy relied on the development of sufficient nuclear weapons, and the diversity of means to deliver them, to convince the former Soviet Union that they would have very little likelihood of success in a first strike option. The former Soviet Union would thus face a devastating retaliatory nuclear strike in response.

Until the SDI proposal of the 1980's, U.S. strategic deterrence was based solely on a retaliatory, offensive force response. The former Soviet Union, on the other hand, had continued to deploy the anti-ballistic-missile (ABM) system

permitted as a result of the 1972 ABM Treaty, along with its strategic offensive force build-up. President Reagan's support of the SDI Program served to refocus U.S. strategy to develop a system that would defend the continental U.S. against a Soviet first-strike. The goal of the SDI Program, and ultimately its initial Strategic Defense System (SDS) Phase I **defensive system,** was to enhance deterrence by substantially increasing the uncertainty of a successful Soviet first strike.[25]

SDS Phase I Concept In 1989

The original requirements for the SDS Phase I sought to deal with a large scale attack of thousands of missiles from the former Soviet Union on the traditional East-West model. The changing world situation has impacted the SDI concepts and requirements, however, the current SDI requirements have developed from the 1989 SDS Phase I requirements.

The SDS Phase I Concept for strategic defense as outlined in the 1989 SDIO Annual Report to Congress called for an in-depth defense strategy to react to the boost, post-boost, and terminal phases of a ballistic missile launch. The **three-tiered** system, with each tier working independently, was to be 80 percent effective at each layer, as opposed to the attacker's goal of 90 percent confidence in successfully destroying the target. Hypothetically, a former Soviet planner was required to dedicate 20 weapons to a single target to insure the 2 to 1 kill ratio desired for penetrating a single-tiered defense. Faced with two-

tiers, he needed 100 weapons. Against the three-tiered defense system, he needed 500 weapons against each target to attain a high probability of kill.[26] Against the three-tiered defense system envisioned in the 1989 SDS Phase I, the confidence levels needed to conduct a first-strike would be virtually unattainable. The 80 percent effectiveness criteria set forth would greatly complicate the targeting problem for former Soviet planners since they could not be certain which missiles would survive the fly-out and reach their targets. Thus, SDI would greatly increase the probability that a significant portion of the U.S. National Command Authority (NCA) and strategic retaliatory forces could survive a first-strike. This prospect would greatly strengthen U.S. deterrence by dramatically reducing the Soviet certainty of first-strike success.

The initial SDS Phase I triple-layered defense concept assumed the establishment of an infrastructure to support the system. It called for the following components: a Boost Surveillance and Tracking System (BSTS) for detection and acquisition; a Space-Based Surveillance and Tracking System (SSTS) for post-boost acquisition; a Ground-Based Surveillance Tracking System (GSTS) for penetration aids (PENAID's) and reentry vehicle (RV) tracking; a Ground-Based Radar (GBR) for acquisition and tracking; a Ground-Based (Exoatmospheric) Interceptor (GBI) for RV destruction; a directed energy Space-Based Interceptor (SBI) for RV and booster destruction; and the associated command center (CC).[27]

SDS Phase I 1990 Architecture

The architecture chosen in 1990 for the first phase SDS was in fact a **two-tiered**, rather than a three-tiered system. It would operate in the boost/post-boost layers as well as during the mid-course layer.[28] The selected system differs from the 1989 conceptual system in that it employs both a space-based and ground-based **kinetic energy (KE) interceptor**. The significant difference is the adoption of the **"Brilliant Pebbles"** (BP) kinetic energy interceptor, rather than the directed energy SBI.[29] The BPs are designed primarily to intercept and destroy targets in the boost/post-boost tier. The BP elements of the 1990 Phase I SDS would be deployed in low-earth orbit. Several thousand orbiters would be in the BP element. The BP forms the space-based kinetic energy interceptor element of the two-tiered SDS; it will operate in conjunction with the ground-based tier consisting of the kinetic energy GBI.[30]

Figure 3 depicts the two-tiered Phase I SDS Architecture presented in the 1990 Annual Report to Congress. It antedates the 1991 SDI redirection by President Bush. The figure portrays the primary functions of the Phase I SDS.

Phase I SDS Architecture

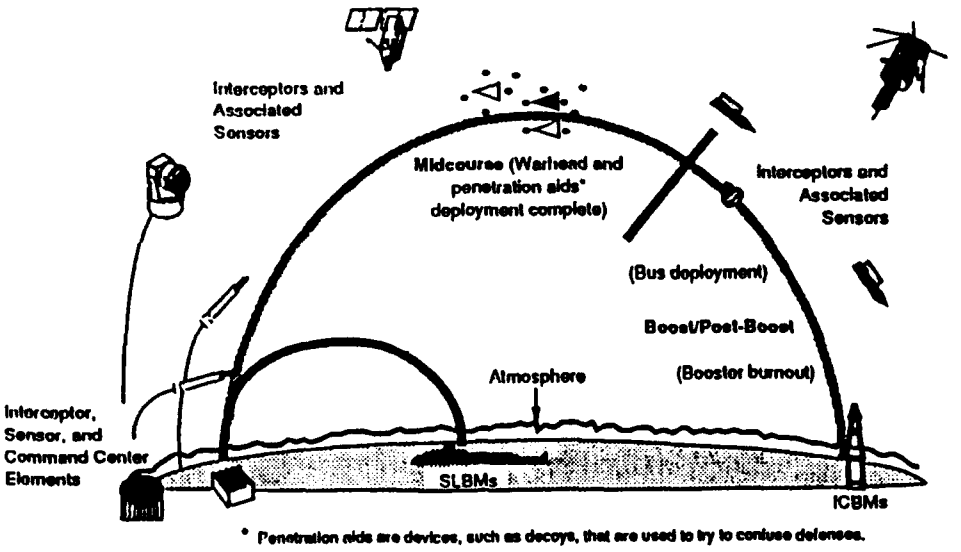


FIGURE 3. 1990 PHASE I SDS ARCHITECTURE[31]

The Phase I SDS was designed to meet the mission requirements laid down by the Joint Chiefs of Staff (JCS) in 1987. The JCS requirements incorporate the military's views on the minimum defensive capability that would add meaningfully to deterrence of a Soviet first-strike.[32] Thus, the initial Phase I SDS met the requirements laid down by the JCS, in response to the strategic threat posed by quantitative and qualitative improvements in Soviet strategic offensive and defensive (ABM) forces.

The program was developed as a deterrence against the likelihood of a successful first-strike. It developed under

three specific criteria. The ultimate criterion was to establish an effective strategic defense system capable of countering to a meaningful degree the expanding offensive ballistic missile capability of the former Soviet Union . The program was based on three criteria:

> -- **Military Effectiveness:** A defense against ballistic missiles must be able to destroy a sufficient portion of an aggressor's attacking force to deny confidence.
>
> -- **Adequate Survivability:** The system must maintain a sufficient degree of effectiveness to complete the mission.
>
> -- **Deterrence:** Increased offensive capabilities cannot overcome the defensive options.[33]

These criteria, incorporating the JCS requirements, are valid requirements for the strategic defense system envisioned under the 1991 SDI redirection as well.

NATIONAL REDIRECTION OF SDI

The Transition From 1989 To 1991

The redirection of the SDI Program represents a response to a dramatically changing world threat as well as political and fiscal realities within the United States. The irony of a transition from a bipolar to a multipolar world is that the United States and its allies will have to deal with many multifaceted contingencies which did not concern them in the past. No longer will the world be able to rely on the relative

predictability and stability provided by the two super-powers of the bipolar world. The multipolar world can no longer count on the two super-powers to quell worldwide political instabilities which, with the proliferation of ballistic missiles, could increase their potential use, including accidental or unauthorized launches. Thus, the United States, its deployed forces, and its regional allies in the coming decades are faced with the growing threat of a limited ballistic missile strike from a Third World nation.

Responding to this changing global situation, President Bush in 1989 directed a policy and strategy objective review by means of the National Security Review Process. Within this review process, Secretary of Defense Cheney directed a review of the SDI Program in the fall of 1989. The findings of that review were reported to the Secretary on 15 March 1990. A key recommendation of the report called for closer attention to the threat posed by ballistic missile proliferation. It recommended that the Defense Department evaluate options to provide protection against a limited strike.[34] This recommendation led to a strategy and feasibility study to structure the SDI Program to provide a Global Protection Against Limited Strike (GPALS) system, which was approved by the Secretary of Defense and the Joint Chiefs of Staff, and ultimately led to a decision briefing to the President on 3 January 1991.[35]

On 29 January 1991, in his State of the Union Address, President Bush announced the redirection of the SDI Program and

set the framework for development of a "global" defense program:

> ... I have directed that the SDI Program be refocused on providing protection from limited ballistic missile strikes, whatever their source. Let us pursue an SDI Program that can deal with any future threat to the United States, to our forces overseas and to our friends and allies." [36]

The national interests and objectives of the United States in the 1990's are set forth in the 1991 Nation Security Strategy: "The survival of the United States as a free and independent nation, with its fundamental values intact and its institutions and people secure."[37] Consistent with this stated U.S. objective, the U.S. has relied on a stable deterrent and flexible response option strategy to secure those interests. The redirection of the SDI Program and the development of GPALS now has been designated as a national security goal designed to satisfy the U.S. objectives.[38]

The National Strategy and stated U.S. policy was translated into law with the President's signing, on 5 December 1991, of the FY1992 Defense Authorization Act. Included with the 1992 Defense Act is the Missile Defense Act of 1991, which specifically acknowledges the SDI portion of the Bill. The law specifically directs the Secretary of Defense to:

> 1. ...aggressively pursue the development of advanced theater missile defense systems, with the objective of downselecting and deploying such systems by the mid-1990's...
>
> 2. ...develop for deployment by the earliest date allowed by the availability of appropriate technology or by fiscal year 1996...the...initial site of an ABM system capable of providing a highly effective

> defense of the United States against limited ballistic missiles;
>
> 3. ... submit to the Congressional defense committees (within 180 days) a plan for the deployment of the theater and U.S. defense system mentioned above.[39]

The President, and possibly more importantly, Congress, have now established with some urgency the requirement for a "highly effective" ballistic missile defense system to protect the continental United States, its forward deployed forces, and its allies from a limited attack.

What Is GPALS?

The redirection of the SDI Program to GPALS altered the priority of SDI requirements to a limited defense system. Formerly, Phase I SDS was directed to deal with large massive attacks by the former Soviet Union on the old East-West model. Now, however, came a fundamental philosophical change. The U.S. decided to develop an "operational defensive" system at the earliest possible time. Earlier, it had been conducting a technological development program aimed at bolstering nuclear deterrence, which emphasized Soviet containment. The U.S. philosophy of deterrence relied upon its ability to make clear to potential enemies that the U.S. response to nuclear attack would far outweigh any possible chance of success. Now that there is a reduced nuclear deterrent strategy required for the Soviet model, the U.S. must address a new strategy reflective of the changing

global threat. Rather than responding to massive nuclear attack with massive retaliatory capabilities, the U.S. must establish a new strategy built upon a means of defending against ballistic missile attacks in all regions of the world. Thus, a deterrence strategy based on a defensive capability is the current objective. The new strategy also emphasizes the ability to respond to regional security threats and hot spots.

GPALS is thus an antimissile system designed to protect against limited ballistic missile strikes whether they are deliberate, accidental or unauthorized - whatever their location. The GPALS defensive system will consist of the following:

> -- Surface and Space-based sensors to provide global, continuous surveillance and tracking of ballistic missiles of all ranges from time of launch... the sensors would provide information to U.S. forces, and potentially, to those of our allies...
>
> -- Surface and Space-based interceptors, capable of providing high-confidence protection to targets under attack. The surface-based interceptors, located in the U.S., deployed with U.S. forces and, potentially, deployed by U.S. allies, would intercept any type target warhead launched by a ballistic missile. Space-based interceptors would provide continuous, global interdiction capability against missiles with ranges in excess of 600-800 kilometers.[40]

Accordingly, GPALS will be less than half the size of the 1990 SDS Phase I Architecture previously illustrated in Figure 3. The estimated cost for the development, production and deployment of all elements of GPALS is $46 billion (FY 1991 dollars) over 14 years. At its maximum level during the mid-1990's, GPALS is

estimated to require $7 billion per year. This represents approximately 20 percent of the amount spent per annum today on strategic programs.[41] Figure 4 depicts the full-up GPALS system.

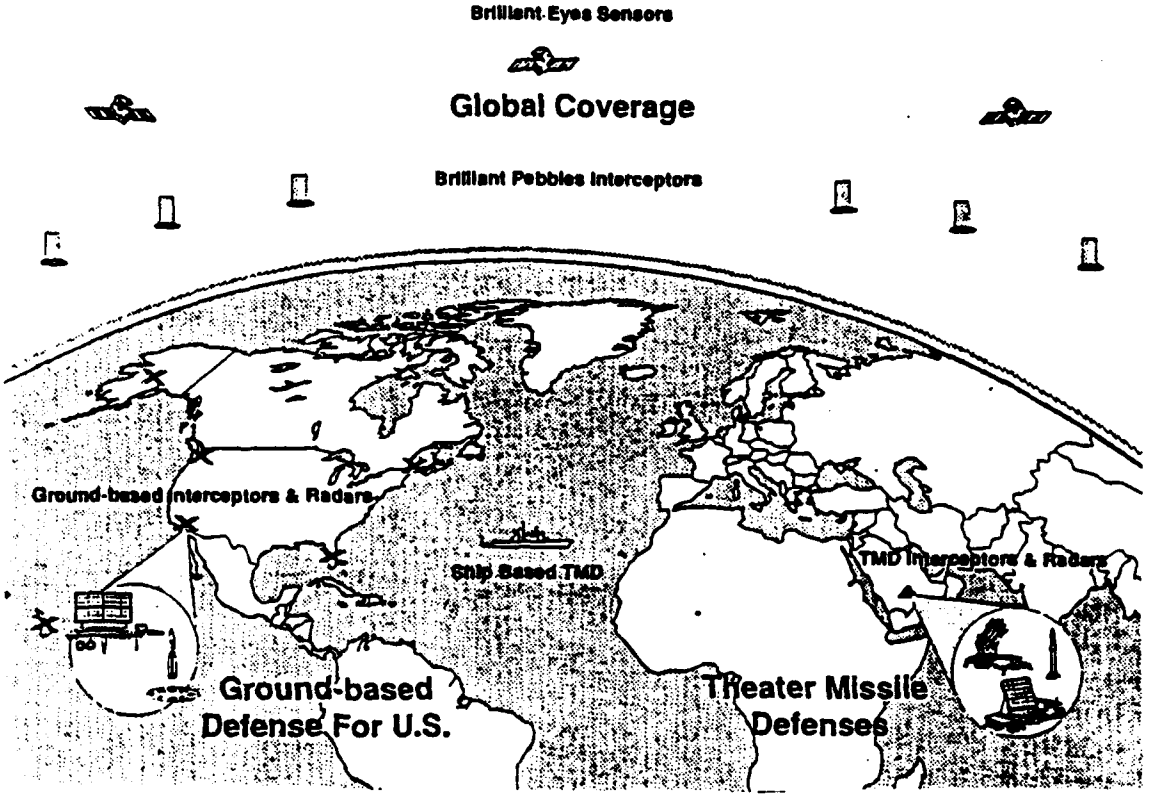


FIGURE 4. GPALS SYSTEM ILLUSTRATION[42]

THE THREE SEGMENTS OF GPALS

The SDIO has divided the GPALS System into three segments: a National Missile Defense (NMD) to protect the continental U.S.

(CONUS), Alaska, and Hawaii against strategic ballistic missiles in mid-course and terminal phases; a Global Missile Defense (GMD) to intercept both theater and strategic ballistic missiles in boost/post-boost and mid-course phases; and a Theater Missile Defense (TMD) to provide defense against theater/tactical ballistic missiles for U.S. deployed forces or allies. As with SDS Phase I, there is also a functional command and control (CC) element which integrates each element.[43]

As with SDS Phase I system, GPALS will be a layered system. However, the GPALS concept of operations (CONOPS) is fundamentally different. SDS Phase I concentrated on blunting the thrust of a massive Soviet first-strike. Objectives of the SDS Phase I system were to break up the massive attack, deny focus to the attack, and cause the enemy to doubt his prospects of a successful first strike. It added up to deterrence. A limited system such as GPALS is not so systematically focused. Now the system will have to kill a limited set of targets with a "high confidence" rate. This change in focus requires a corresponding change in the effectiveness at which the system will now be required to operate.[44] Rather than an 80 percent effectiveness against a target set of 5,000 targets, the GPALS will have to operate at greater than 95 percent effectiveness against far fewer targets, possibly numbering in the hundreds, or less in a Third World scenario.

National Missile Defense (NMD)

The NMD is a limited defense system program for the development of an ABM System that will provide a highly effective defense of CONUS against limited attacks. It will be controlled by the Commander-in-Chief (CINC), U.S. Space Command (USSPACECOM).

The NMD program consists of four elements: Ground-Based Interceptor (GBI), an exoatmospheric interceptor to destroy RV's in mid-course, to be deployed only for U.S. defense and to use force of impact only (kinetic energy); "Brilliant Eyes (BE), a space-based sensor for surveillance, tracking and discrimination, used primarily to support ground-based radars; Terminal Defense Ground-based Radar (GBR-T) and Ground-based Surveillance and Tracking System (GSTS) for search, tracking and discrimination to support the ground-based interceptor.[45]

Initial National Missile Defense (INMD)

As part of the NMD, the INMD is a sub-program which is designed to meet the congressional language in the 1992 Defense Bill to develop, at the earliest possible date and not later than FY1996, an ABM Treaty compliant ABM System at a single site. INMD is viewed as the first step to GPALS. The single site has been designated as Grand Forks, North Dakota, which is the site of the single ground-based radar associated with the abandoned U.S. ABM Program.[46]

The INMD will consist of 100 ground-based interceptors, the

design of which will be determined by competition. Additionally, a fixed, ground-based ABM battle management radar will be used, optimally integrated with space sensors not prohibited by the ABM Treaty. This includes the GSTS of the full-up NMD System previously discussed.[47]

Global Missile Defense (GMD)

In the development and acquisition of the GPALS, GMD will provide global detection and interception of ballistic missiles in the boost/post boost and mid-course phase. This segment calls for the addition of a single element: the space-based interceptor "Brilliant Pebbles". Obviously, to provide global coverage, any system must include a space-based interceptor. Beyond the heavy reliance on GBI's in INMD and NMD, a minimum SBI must be deployed. The issue is not whether it is needed. The issue is whether the United States will be in space with space-based interceptors at all. The 1991 Defense Bill presently excludes deployment of BP's in the initial limited GMD system. The Bill does, however, provide funding for development of "promising" follow-on ABM technologies, including BP.[48]

Theater Missile Defense (TMD)

Under this segment, the ground-based interceptors and mobile radars are deployed to regional and theater areas throughout the globe. Secretary Cheney has directed that TMD be accelerated to be ready for deployment by the mid-1990's. The current schedule

calls for the deployment of the upgraded PATRIOT system in FY1993; the ERINT (Extended-Range Interceptor) by 1994; and ARROW (a joint U.S. and Israeli program) and THAAD (Theater High Altitude Area Defense) by 1996. Deployment of BP and BE could begin by the end of the decade.[49]

The breakout of the estimated $46 billion cost of the three segments is as follows:

- $25 billion for ground-based defenses (INMD and NMD), which includes space-based support sensors
- $11 billion for space-based global defenses (BP)
- $10 billion for TMD[50]

SDI IMPLICATIONS FOR ARMS CONTROL AND NEGOTIATIONS

No one questions the enormous pressures faced by the super-power leaders as they confront the dramatically changing world situation. U. S. President Bush and Russian President Yeltsin, like his predecessor Gorbachev, are taking unprecedented steps to reduce their strategic forces. No longer can arms-control talks and treaty negotiations be viewed as some long and arduous process between large delegations representing East-West super-powers. Today's world leaders have now established the world as an international stage for arms-control and negotiation proposals. Each leader has proposed sweeping reductions in strategic forces on an almost daily basis. With these proposals, new and previously unthinkable multifaceted relationships among

former enemies are emerging at a dizzying pace.

Regarding the SDI Program, President Yeltsin has reiterated the Russian Republic's support not only for the 1972 ABM Treaty but also for all bilateral and multilateral arms-control agreements agreed to by the former Soviet Union. Additionally, two of the three republics (Ukraine and Belarus) of the former "Union", on whose territory strategic nuclear weapons remain, have announced their intention to abide by previous treaties. The fourth, Kazakhstan, has tacitly indicated support, but has not yet made a public commitment. More importantly, however, is Yeltsin's 29 January 1992 response to President Bush's proposal the previous day to move jointly towards a joint global missile protection system. In addition to eliminating existing Russian anti-satellite systems on a reciprocal basis with the United States and alluding to a full U.S. SDI implementation, Yeltsin stated Russia was prepared " to develop, create, and jointly operate a global defense system, instead of the SDI system".[51]

The SDI Program has consistently been pursued , in the view of the U.S., as a technology program conforming to the boundaries set forth by all international agreements, including the 1972 ABM Treaty. However, the U.S. has long recognized that in order to move towards a meaningful defensive system against strategic missiles, modifications to the ABM Treaty would be necessary. This must be even before deployment of an NMD segment under the GPALS redirection, since it calls for employment of space-based systems. In the 1991 Missile Defense Act, Congress urged the

President to pursue immediate discussions with the "Soviets" (to indicate just how fast things are changing on the international scene, legislation cannot be kept up to date) on the feasibility and mutual interest of amendments to the ABM Treaty to permit:

- Additional ground-based sites.
- Increased use of Space-based sensors for direct "Battle Management".
- Clarification about permitted development and testing of space-based defenses.
- Clarification of distinction between theater and strategic ABM defense.[52]

The INMD sub-segment of the GPALS system can and will be deployed without need for treaty modifications. However, in the near term, if the U.S. continues to concentrate the SDI redirection towards the fielding of a ground-based system (i.e. NMD) for complete CONUS defense, without the addition of at least six additional ground-sites and a space-based portion as a follow-on, an "effective" protection cannot be achieved. Thus, the ABM Treaty must be modified to accommodate full implementation of NMD system.

In order for a full-up GPALS under the current concept to respond to the global proliferation threat and changing regional situation, the U.S. must negotiate a "Global Treaty" for the employment of space systems. Russian President Yeltsin's apparent 29 January 1992 acceptance of the U.S. proposal to move forward jointly on a global defense system may set the foundation for the pursuit of such a global treaty, possibly within the

Defense and Space Talks. These talks, underpinning talks to START, may now be able to move forward productively. Without such an international formulation, the U.S. and Russia, as the most powerful leader of the new Commonwealth of Independent States (i.e. former Soviet States), will have to move bilaterally in order to provide protection against missile strikes on a global basis. Hopefully, the emerging U.S.-Russian partnership on this issue will pave the way for a Global Treaty, perhaps facilitated by the U.N.

SDI has played an essential part in bringing the arms-race to an end. Ultimately it has helped bring about dramatic changes in the East-West relations. Concerns about the threat posed by proliferation of Third World ballistic missiles have provided the catalyst for the joint U.S. - Russian acceptance that a joint global ballistic missile defense system may, in fact, be an appropriate response to the threat posed by ballistic missile proliferation. However, as long as the U.S. Congress requires ABM Treaty compliance for deployment of an anti-ballistic-missile system the resolution of ABM Treaty limitations and acceptance of space-based interceptors must be negotiated.

Seven Third World countries have used ballistic missiles in the last two decades. In four of these incidents, U.S. forces or U.S. allies were targeted. In the 1973 Arab-Israeli War, Egypt and Syria used ballistic missiles against Israel. In the Eight Year War of the Cities, both Iran and Iraq used them. Libya fired a ballistic missile at a U.S. target in the Mediterranean

Sea following the U.S air strikes on Libya. Hundreds of ballistic missiles have been fired in the Afghanistan War. Finally, the Iraqis used ballistic missiles against Israel and U.S. - led coalition forces in the Gulf War. Thus, even though negotiations of treaties to deploy effective global space-based defensive systems are necessary, we must as well move to negotiate a global ballistic missile non-proliferation policy. This is possibly the more important "Strategic Defense Initiative". The probability of a world devoid of ballistic missile threats is highly unlikely, at least by the year 2000. So the pursuit of a regime under which ballistic missile proliferation is stopped, and which allows for the deployment of the GPALS missile defense system globally, is critical to the establishment of world stability. The peace must be pursued on two fronts.

Missile Technology Control Regime (MTCR) and Proliferation

U.S. leadership is the key to achieving an end to ballistic missile proliferation and to establishing a global defensive system to render those missile technologies currently proliferated ineffective. The U.S. should build upon ABM Treaties, START, the Nuclear Non-proliferation Treaty and other existing protocols that take limited steps toward these goals. With the reality of the changing world situation, the U.S. should rely less on formal negotiations and more on unstructured unilateral and reciprocal bilateral and multilateral actions that

can be implemented immediately. We are not merely dealing with arms-control. As Representative Les Aspin recently stated, we have now undertaken "Threat Control".[53] He is referring to ballistic missiles and weapons of mass destruction, as they have proliferated throughout the Third World.

The U.S. has recognized the changing world situation and has taken steps to build upon these dramatic developments. The U.S. should now lead an international effort to stop the spread of ballistic missiles and missile technology. With the removal of the missiles and the technology to develop and produce them, the world threat from their use would be greatly reduced. The existing regime, which attempts to slow missile and missile technology proliferation, is based on the 1987 Missile Technology Control Regime (MTCR), a non-binding agreement. Any long-term arms-control and non-proliferation strategy must now address the threat of missile proliferation in a broad global context.

The United States recognizes the need to redirect strategy toward other regional and global proliferation objectives. In President Bush's August 1991 National Security Strategy document, the following objective for the 1900's was presented:

> ... prevent the transfer of military critical technologies and resources to hostile countries or groups, especially the spread of chemical, biological and nuclear weapons and associated high-technology means to delivery:[54]

The administration thus realizes that with the main elements of European arms-control in place, it must address the more urgent

task of stopping global proliferation of weapons of mass destruction and the missiles to deliver them. A three-tiered non-proliferation strategy has been proposed. It offers a new regional, global, and multilateral approach to arms-control, a significant departure from the strategy of the past three decades. The President's proposed three-tiered strategy is as follows:

- to strengthen existing arrangements;
- to extend the membership of multilateral regimes directed against proliferation;
- and to pursue new initiatives.[55]

Thus, the need to curb proliferation of advanced weapons has been realized and incorporated into the national strategy. Now the need to develop new approaches towards arms-control which will curb proliferation must be addressed. Further, the U.S. must acknowledge that even the proper approaches do not lead to easy implementation.

All nations, especially Third World nations, share common motivations for weapons proliferation: they want to respond to perceived threats, or they desire to pursue either political or military objectives. They are generally unconcerned about the category of weapons; chemical, nuclear, or ballistic missiles will equally serve their needs.

Treaties are an obvious means for dealing with such arms-control problems. According to Ambassador Lehman, Director, Arms Control and Disarmament Agency, in the international nuclear non-

proliferation regime, we have produced the Nuclear Non-Proliferation Treaty. On the other hand, regionally there is the Treaty of Tlateloco which deals with nuclear non-proliferation and the establishment of a nuclear free zone within Latin America. However, Ambassador Lehman goes on to state:

> In the missile proliferation area, we have no such treaties. We are engaging in a review of this overall issue within the Administration. And one of the questions that we will obviously have to address is whether there is a role for a treaty or treaties in this area, or whether the missile proliferation issue is really quite different than the nuclear proliferation issue. A second tool that is available to us is the development of a international safeguards regime. Again we have the IAEA safeguards in the nuclear area, but we have no such institutional basis clearly established in the missile proliferation area.[56]

The only and most viable present means to control the proliferation of missiles and missile technology is the Missile Technology Control Regime (MTCR). This regime was begun secretly in 1983 between the United States and six allied countries (Canada, France, Great Britain, Italy, Japan, and West Germany) and openly adopted in April 1987. However, the MTCR is not a treaty, but simply a voluntary agreement by the signatories to "limit the risks of nuclear proliferation by ontrolling technology transfer that could make a contribution to nuclear weapons delivery other than manned aircraft."[57] By default, the MTCR protocol thus seeks to limit missile proliferation. The MTCR is based on diplomatic consultation and information exchange with no enforcement provisions.

The MTCR does have support, but it, by itself, has not proven strong enough to stop determined efforts to acquire longer-range ballistic missiles. There is no regime which takes into account all of the players in ballistic missile proliferation. It is evident, however, that without the inclusion of the proliferating states and recipient states, there is little likelihood that an effective monitoring or control regime will be forthcoming. Comprehensive plans for regional arms-control have called for modification to existing arms-control regimes, such as START and INF. These suggestions offer more promise for establishing long-term goals than for establishing a regime that could attain an immediate effect. Such modifications would also require a long and laborious diplomatic undertaking. Though it would potentially bring the parties with varying strategic requirements into a common regime, the fact that Third World countries feel they have the legitimate right to possess ballistic missiles and to acquire space launch technology, is a principle which may go beyond the regional stability issue and, thus, it may be beyond the capability of the international community to stop the proliferation through treaty or negotiation. The MTCR, despite its shortcomings, continues to offer the best regime, and possibly the only regime, for controlling ballistic missile proliferation in the future.

An arms-control regime in and of itself will not dissuade the proliferation of ballistic missiles or their use by those countries which have already procured them. The developed

countries must continue to promote regional arms-control initiatives through the MTCR. However, to minimize the dangers of inter-regional and intra-regional use of ballistic missiles, especially the shorter-range missiles currently proliferated throughout the Third World, there will be a greater need for the development and deployment of a theater GPALS system (i.e. TMD). Given the projected proliferation by the year 2000 of the longer-range missiles, the call for the full-up GPALS for the protection of the U.S. and allied areas will also be greater.

Of course, there is no simple resolution to the problem. The missile proliferation problem cannot be taken care of by either an arms-control regime or a defensive system separately, but only through a combination of both. The long term strategy must strengthen the MTCR to reduce missile proliferation; concurrently, it must deploy GPALS to counter those missiles which are already deployed. Reducing the likelihood of success of a ballistic missile attack correspondingly reduces the demand to acquire such weapons.

CONCLUSION

United States leadership is the key to achieving an end to the threat posed by the proliferation of ballistic missiles and weapons of mass destruction in this multipolar and constantly changing geo-political world. The collapse of the former Soviet Union has dramatically reduced the chance of a major East-West

nuclear confrontation. However, we now face new and growing uncertainties. Military capabilities in the Second and Third Worlds will expand considerably in the coming decade. Threats and crises will erupt in areas which cannot now be anticipated. The potential for turbulence, instability, and conflict exists in every region of the world. Incidents of proliferation of weapons of mass destruction are increasing, especially into regions where conflicts are most likely.

The United States has the unprecedented opportunity to offer the World stability and an "effective" defense against accidental, unauthorized, or -- more importantly and more likely -- irresponsible Third World ballistic missile launches. Such launches have occurred during seven crises since 1973. The more countries possessing these weapons, even if procured as regional deterrents, the greater the likelihood they will be used. In the past two decades during Third World crises, those belligerents which have had ballistic missiles, have used them without hesitation. Though the direct threat to CONUS may not be great in numbers (and this estimate is arguable) by the year 2000, the threat posed to Europe, the Middle East, and South or Central Asia is, according to all estimates, growing. Thus, the requirement driving the SDI Program redirection to Global Protection Against Limited Strikes (GPALS) responds to a clear and present danger now and to an unpredictable expanding threat in the future.

The GPALS, in and of itself, is not the complete answer to

the threat posed by weapons of mass destruction, either those within the republics of the former Soviet Union or those proliferated to the Third World. But it does provide an insurance package or deterrent until arms-controls in general, and MTCR in particular, can be strengthened. Even so, strengthening arms-control regimes and deployment of GPALS is still not the final lynch pin of security in this changing world. The United States and its western allies must create the political atmosphere required to end the need for proliferation of ballistic missiles. This may in fact be hardest to achieve. But it is most probably most vital to world stability.

There is but one "Superpower" in the world today. It enjoys the political, economic, and military capabilities to pursue the task of strengthening proliferation control regimes, deploying the GPALS, and fostering a stabilizing political environment. Recent history, which witnessed the end to the Cold War and the prosecution of the Gulf War through an unprecedented global coalition, attests to U.S. strength, viability, persistence, and diplomacy. Mr. Gates offered an eloquent assessment recently to the Congress "... the collapse of communism has enormously reduced the chance of a major war, but day to day, the world remains a rough neighborhood -- and it's getting rougher. And like it or not, nearly all nations see the U.S., the sole superpower, as the principal force for peace and stability."[58]

ENDNOTES

1. Martin Navias, "Ballistic Missile Proliferation In The Third World. " Adelphi Papers 252 (London: Brassey's Press, Summer 1990),47.

2. W. Seth Carus, "Ballistic Missiles In The Third World, Threat And Response." The Washington Papers 146 (New York, N.Y.: Praeger Publishers, 1984), 3.

3. U.S., Congress, House Armed Services Committee, Statement Of The Director Central Intelligence, Testimony of Robert M. Gates, Director, Central Intelligence, before the House Armed Services Committee, Defense Policy Panel, (Washington, D.C.: 10 December 1991), 2-3.

4. Duncan Lennox, "The Shield Turns Skyward", Jane's Defense Weekly (United Kingdom, 11 January 1992),49.

5. Aaron Karp, "Ballistic Missile Proliferation." SIPRI Yearbook 1991: World Armaments and Disarmament (Oxford University Press, 1991), 317-318.

6. Judge William Webster, Statement to Congress as Summarized in, "We Lead Today What About Tomorrow?", Defense 91 (Washington, D.C.: July/August 1991), 22.

7. U.S. Department of Defense, 1991 Report to Congress on the Strategic Defense Initiative, Prepared by the SDI Organization (Washington, D.C.: May 1992), 1-2.

8. Keith Payne, Missile Defense In The 21st Century: Protection Against Limited Threats Including Lessons From The Gulf War (Boulder: Westview Press, 1991), 32.

9. Karp, 317.

10. Karp, Summary of Table 2., " Nation With Programs for Ballistic Missiles, Space Launch Vehicles, Sounding Rockets, and Weapons of Mass Destruction", 38-44.

11. Ibid.

12. Ibid.

13. Ibid.

14. Ibid.

15. Ibid.

16. Ibid.

17. Ibid., 338.

18. Payne, 32-34.

19. Ibid., 35.

20. Gates, 16.

21. Ibid., 19.

22. Payne, 36.

23. Honorable Jon Kyl, "News Maker Forum", Space News, (Space News, Vol.2 NO. 42, 2-8 December 1991), 38.

24. U.S., Department of Defense, 1989 Report to Congress on the Strategic Defense Initiative, Prepared by the SDI Organization (Washington, D.C.: 13 May 1989), 1-8.

25. Dennis McDowell, "Changing Role for Ballistic Missile Defenses: From Deterrence to Protection." Strategic Review, (Boston: United States Strategic Institute, Summer 1991), 47.

26. U.S. Department of Defense 1989, 2-1.

27. Ibid., 2-4 and 2-5.

28. U.S., Department of Defense, 1990 Report to Congress on the Strategic Defense Initiative, Prepared by the SDI Organization (Washington, D.C.: May 1990), 2-3.

29. Ibid., 5-1.

30. Ibid., 5-16.

31. Ibid., 2-3.

32. Ibid., 2-2.

33. U.S. Department of Defense 1989, 1-9.

34. Ambassador Henry Cooper, "SDI The Changing Face", Defense 91 (Washington, D.C.: May/June 1991), 2.

35. Strategic Defense Initiative Office 6 June 1991 Report, The Presidents New Focus For SDI: Global Protection Against Limited Strike (GPALS), (Washington, D.C.: 6 June 1991), 1. (Hereafter referred to as "6 June 1991 SDIO Report")

36. Ibid., 2.

37. U.S., President, National Security Strategy of the United States, (Washington, D.C.: U.S. Government Printing Office, August 1991), 3.

38. Ibid., 27.

39. SDIO Memorandum For Under Secretary of Defense for Acquisition, Subject: UTTMD and GPALS Reviews/DAB's (Washington, D.C.: 9 December 1991), 1.

40. 6 June 1991 SDIO Report, 1.

41. Ibid., 6.

42. Ibid.

43. Major Defense Acquisition Program (MDAP) Document, GPALS System/BMC3, (SDIO, Washington, D.C.: 23 October 1991), 1.0. (Hereafter referred to as "MDAP Document GPALS")

44. Jerry Brown, US SPACE COMMAND/AND, Interviewed by Jerry E. Peacock, 12-13 December 1991, Colorado Springs, Colorado.

45. Major Defense Acquisition Program (MDAP) Document, National Missile Defense (NMD), (SDIO, Washington, D.C.: 23 October 1991), 3.0. (Hereafter referred to as "MDAP NMD")

46. Phil Bolger, Capt., USAF, U.S. SPACE Command/J2SO, Interview by Jerry E. Peacock, 12-12 December 1991, Colorado Springs, Colorado.

47. SDIO Summary Vugraph, 1991 Missile Defense Act (Excluding TMD), Provided by U.S. SPACE COMMAND/J2SO during discussions 13 December 1991.

48. 6 June 1991, SDIO Report, 5.

49. Ibid.

50. Ibid., 6.

51. Michael Dobbs, "Yeltsin Offers Cuts In A-Arms", The Washington Post, 30 January 1992, A1.

52. SDIO Summary Vugraph.

53. Representative Les Aspin, "Nuclear Weapons in an Uncertain Soviet Union: A New Kind of Threat", ROA Nation Security Report, (Washington, D.C.: Reserve Officers Association of the United States, November 1991), 26.

54. U.S. President 1991, 3.

55. Ibid.

56. U.S., Congress, Senate, Government Affairs Committee, Nuclear and Missile Proliferation, Statement of Ronald F. Lehman II, Director, Arms Control and Disarmament Agency, (Washington, D.C.: 18 May 1989), 31.

57. Carus, 56.

58. Gates, 22.

BIBLIOGRAPHY

Aspin, Les. "Nuclear Weapons in as Uncertain soviet Union: A New Kind of Threat". ROA Nation security Report. Washington, D.C.: Reserve Officers Association of the United States, November 1991.

Carus, W. Seth. "Ballistic Missiles In The Third World: Threat And Response". The Washington Papers 146. New York, N.Y.: Praeger Publishers, 1984.

Cooper, Henry. "SDI The Changing Face". Defense 91. May/June 1991.

Dobbs, Michael. "Yeltsin Offers Cuts In A-Arms". The Washington Post, 30 January 1992, A1.

Donovan, Frederick, and James Goodby. Changing The Rules: President Reagan's SDI Decision Case # 320. Pittsburgh, Pa.: University of Pittsburgh, 1988.

Foreign Policy Research Instituted. "Global Perspective on Arms Control". Foreign Policy Issues. New York, N.Y.: Praeger Publishers, 1984.

Hull, Andrew. "The Role of Ballistic Missiles in Thire World Defence Strategies". Jane's Intelligence Review Vol.3 No. 10. United Kingdom: Jane's Information Group Ltd., October 1991.

Karp, Aaron. "Ballistic Missile Proliferation". SIPRI Yearbook 1991: World Armament and Disarmament. Oxford University Press, 1991.

Kutyna, Donald J., GEN., USAF. "We Lead Today, But What About Tomorrow?". Defense 91. July/August 1991: 20-29.

Kyl, Jon. "News Maker Forum". Space News Vol.2 No.42. 2-8 December 1991.

Lennox, Duncan. "The Shield Turns Skyward". Jane's Defense Weekly. 11 January 1992.

Mc Dowell, Dennis. "Changing Role For Ballistic Missile Defense: From Deterrence To Protection". Strategic Review. Summer 1991: 44-51.

National Academy of Sciences. Committee on International Security and Arms Control. Challenges For The 1990's For Arms Control and International Security. Washington: National Academy Press, 1989.

Navias, Martin. "Ballistic Missile Proliferation in the Third World". Adelphi Papers 252. London: Brassey's, Summer 1990.

Payne, Keith B. Missile Defense In The 21st Century: Protection Against Limited Threats Including Lessons From The Gulf War. Boulder: Westview Press, 1991.

Ra'anan, Uri and Robert L. Pfaltzgraff, Jr., eds., International Security Dimensions of Space. Hamden, Connecticut: The Shoe String Press, Inc., 1984.

Richardson, Robert D., Brig. Gen., USAF (Ret.). "SDI Is a New Mission for NATO to Save Its Future and the World's". ROA National Security Report. Washington, D.C.: Reserve Officer Association fo the United States, January 1992.

U.S. Congress. House. Armed Services Committee, Statement of The Director Central Intelligence, Testimony of Robert M. Gates before the Defense Policy Panel. Washington, D.C.: 10 December 1991.

U.S. Congress. Senate. Armed Services Committee, Threat Assessment, Military Strategy, and Operational Requirements, Hearings. 101st Cong., 2nd sess. Washington, D.C.: 7 March 1990.

U.S. Congress. Senate. Governmental Affairs Committee, Nuclear and Missile Proliferation, Hearings. 101st Cong., 1st sess. Washington,D.C.: 18 May 1989.

U.S. Department of Defense, 1989 Report To The Congress On The Strategic Defense Initiative. Washington, D.C.: 13 March 1989.

U.S. Department of Defense, 1990 Report To The Congress On The Strategic Defense Initiative. Washington, D.C.: May 1990.

U.S. Department of Defense, 1991 Report To The Congress On The Strategic Defense Initiative. Washington D.C.: May 1991.

U.S. General Account Office. Report to the Chairman, Legislation and National Security Subcommittee, Committee on Government Operations, House of Representatives. Strategic Defense Initiative Need to Examine Concurrency in Development of Brilliant Pebbles. Washington, D.C.: Government Accounting Office, March 1991.

U.S. President (Bush). National Security Strategy of the United States. Washington D.C.: August 1991.

Worden, Simon P. SDI and the Alternatives. Washington, D.C: National Defense University Press, 1991.